Comparison Usability Test

Asha Kalsi V00904259
Doug Williscroft V0061046240
Jeet Bains V00914471
Riya Sood V00928707

Introduction

This paper compares two mental health-focused prototypes. The first application that will be analyzed is ‘Smile’ which was designed to support young adults who experience anxiety and help them develop coping mechanisms. The second application is "ACT to Enrich Your Life," created to support adults experiencing emotional and mental distress due to alienation from authentically self-nourishing goals and values. Both prototypes were evaluated using the nine-step usability testing model Kushniruk and Patel (2004) described. The nine-step model was used to analyze the similarities and differences between the prototypes and identify challenges and potential improvements. The paper will go into detail about the evaluation objectives, study design, the sample selection, the environment in which the usability testing was conducted, the background questionnaires sent to participants, the tasks the participants were asked to perform, the data collection and analysis for both prototypes usability test and the changes made to both prototypes as a result of the usability testing.

Background

'Smile' and 'ACT’ goals were to support and provide helpful resources to users experiencing sub-clinical mental health and emotional challenges. The target mental health and emotional challenges the application supported were difficulties managing life stress, functionally debilitating anxiety, social isolation, and sub-clinical depression. However, the two applications are based on different underlying principles regarding how to address the mental health challenges explained above optimally.

Smile

The primary focus of 'Smile' is to support users experiencing anxiety and stress and is oriented towards collaborative communication and monitoring by physicians. The mental model of the application is medically-oriented, with journaling symptoms to be shared with care providers and providing time-series graphs of symptom intensity as core functions. In addition, the application allows access to tools and exercises to help users cope with the immediate challenges of panic attacks and other forms of anxiety.

ACT to Enrich Your Life

The primary focus of 'ACT’ is to support users in exploring their internal mental experience in a non-avoidant and non-judgemental way using a variety of modalities. It does not treat the experience of mental and emotional distress as a medical condition but rather as an inevitable consequence of living out of harmony with deeper human needs. The application provides evidence-based exercises to defuse mental distress. Still, these exercises are intended to shift underlying attitudes towards the self and the world and are not oriented towards reducing or relieving them from immediately presenting mental discomfort.

Phase 1: Evaluation Objectives

The objective of the evaluation was to gather feedback regarding the usability of ‘Smile’ and ‘ACT to Enrich Your Life’ (ACT). Both applications underwent a usability test to identify any usability issues, collect qualitative and quantitative data to analyze the usability of the application and combine the strengths of each application into a new hybrid application.

Problem Statements

Smile

Smile’s persona Alyssa has been experiencing social anxiety along with panic attacks and needs to quickly understand her anxiety, develop coping mechanisms, and send journals about her experience to her doctor; to allow her doctor to monitor her symptoms and make changes to her medication accordingly, for her to enjoy her daily activities.

‘Smile’ was developed to provide a calm design that shows minimal information not to overwhelm users and create a safe place. Additionally, it contains meaningful and valuable tools for both the user and their health provider to support their mental health better and reduce the severity and frequency of anxiety symptoms.

ACT to Enrich Your Life

'ACT‘s persona Pat has been experiencing disconnection and isolation due to their workload. Pat is unable to socialize due to work obligations. Furthermore, Pat has been developing new feelings due to feeling isolated and disconnected and wants to learn more about it.

'ACT' was developed to support users like Pat by providing an app that allows them to get to know themselves deeper. It will enable them to document their thoughts and feelings and to go back to evaluate them at a later day and time. Furthermore, 'ACT' is designed to make individuals experiencing that feel better understand themselves and their values and learn how to improve ways to make connections.

Representative User Profile

The representative users for both ‘Smile’ and 'ACT' include young adults of any gender and sexuality experiencing high stress and anxiety levels. The representative users can be new or experienced with computers and technology with low levels of health literacy. These individuals also need to be interested in using applications to support their mental health needs.

Test Design

The evaluation consisted of selecting participants through an interview process to ensure that they met the inclusion criteria for the application. To reduce selection bias, a five-point scoring method was used. The scoring method evaluated participants on their knowledge, experience, mental health status, need for the application, and willingness to use an application.

Once the scoring method was completed and the participants were selected, they received an email with the data, time and instruction about their usability test. The usability testing for both applications was performed remotely via Zoom. Study participants used their computers and self-selected locations to access the prototypes for usability testing. Testing involved participants completing two predefined tasks within each application prototype. Participants were informed that the application screens had been pre-populated and that real-time data entry was not supported. They were asked to input their feelings today and review their coping skills during the 'Smile' usability test. During the 'ACT' usability test, they were asked to perform a self-care check-in and complete more information about their sleep quality. This was done to assess the usability of the applications and understand how the public would maneuver through the features created.

Evaluations Measures

The evaluation measures included the ability to complete the tasks given, any usability and functional errors or issues, subjective measures, which are when the user shares their thoughts on the app's ease of use and their satisfaction, and the likes, dislikes and recommendations are given (Monkman, H.,2021). Moreover, the assessment of system functionality and usability included how to input within refinement of emerging prototypes, Identifying problems in between human to computer interactions, evaluating the effects of a system in regards to the physician decision-making process, and assessing physician decision-making process as a whole (Kushniruk, A. W., & Patel, V. L., 2003).

Phase 2: Sample Selection and Study Design

Determining the user profile for each prototype is critical as researchers need to have representative users when gathering data and information about usability. For both prototypes, the user profile criteria included:

- 18 years old and older
- Any gender and sexuality
- Experiencing symptoms of anxiety
- Experiencing high-stress levels
- Low to high technology literacy
- Has positive correlation use of technology to help them with their mental health
- Has Low to high health literacy,
- Can be a new or experienced user (Monkman, H., 2021).

The sample size for the usability testing included ten eligible individuals. Only ten individuals are chosen because previous research has demonstrated that "8–10 subjects can lead to identifying up to 80% of the surface level usability problems with an information system" (Kushniruk, A. W., & Patel, V. L., 2003). Furthermore, both prototypes study groups will be a within-subject study design. The research team will follow the same individuals through more than one task in the user interface; this subject design utilizes repeated measures (Monkman, H., 2021).

Phase 3: Selection of Representative Experimental Tasks and Contexts

Usability Tasks

‘Smile’ and 'ACT' conducted their usability testing with pre-populated information; therefore, the developers will not ask participants to insert any data into the applications. The core tasks asked during the usability testing will reflect the main objectives of the prototypes. ‘Smile’ contains useful features for young adults experiencing anxiety and panic attacks, and 'ACT' has many features to support those experiencing emotional distress and isolation.

Tasks for the user

	Smile	ACT to Enrich Your Life
Task 1	Navigate to the “Today’s Feelings” feature, check the results, and share results with the physician.	Record Information about your current social, physical and mental health.
Task 2	Navigate to the “Other Tools” option to explore applications coping mechanisms of your choice and log out.	Record details and information about sleep experience using audio notes and written notes.

Table 1: Usability Test Tasks

Smile Tasks Analysis

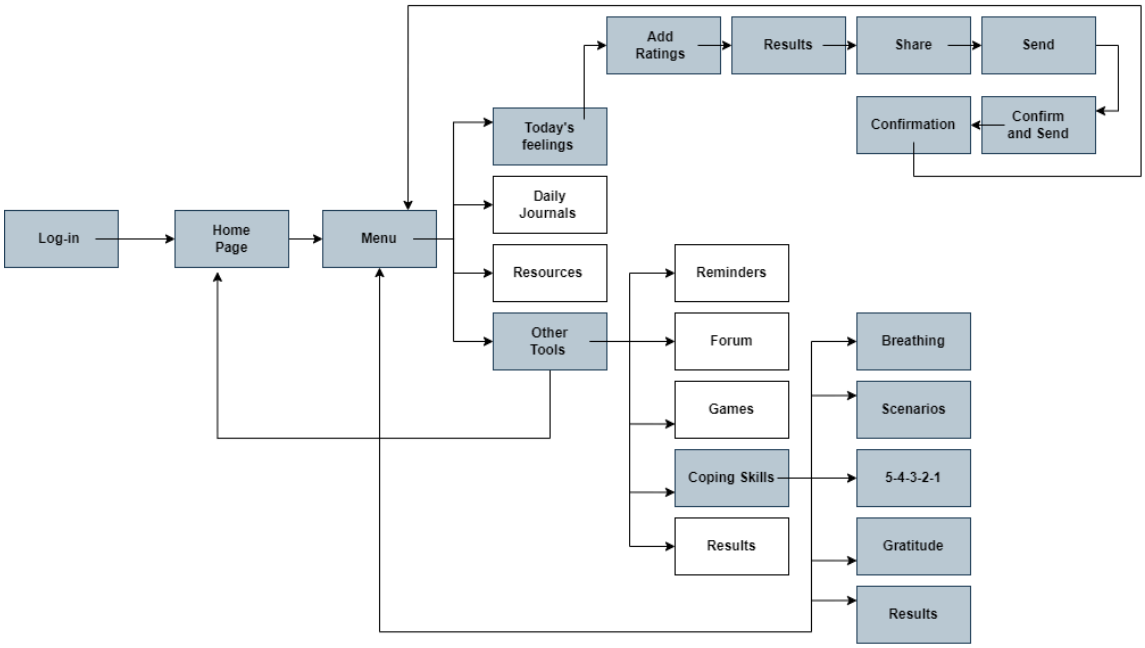


Figure 1: Smile Task Analysis (Only the shaded boxes will be used in the usability testing)

To complete tasks in the 'Smile' application the participant needs to log in to the application using a pre-populated username and password. Once logged in, the participant will be taken to the home page to the menu page. Upon clicking the menu button, the participant will see the following options: Today's Feelings, Daily Journals, Resources, and Other Tools (See figure 1). To complete task one, the participant must choose the option for "Today's Feelings," They will be taken to a page where they can rate their feelings on a scale of 1-5 for the following categories: Depressed, Anxiety, Stress, Overthinking and Emotional. However, during the usability test, the participant will not add information into the categories as it will be prepopulated. Upon completing the ratings, the user must click "Results" to view the graphical data based on a monthly structure. Further, the user can share their results with the doctor by choosing the "Share" option. On the share page, the user can add their doctor's name and email address, and after adding the appropriate information, the user can click "Send." That will take the participant to a confirmation page to show the name and email address of the doctor with whom the information will be shared. If the information is correct, the user can click "Send" again, which will take them to a confirmation page, showing that the email has been successfully sent.

To complete the second task with the coping skills, the participant must click the "Menu" button at the bottom of the confirmation page. This will take them back to the menu page, and they can go into "Other Tools" and choose "Coping Skills." On the coping skills page, they will be presented with the following options: Breathing, Scenarios, 5-4-3-2-1, and Gratitude. The

participant can choose any of the coping skills listed above to explore, and once they complete the task, they can go back to the home page and log out.

ACT to Enrich Your Life Tasks Analysis

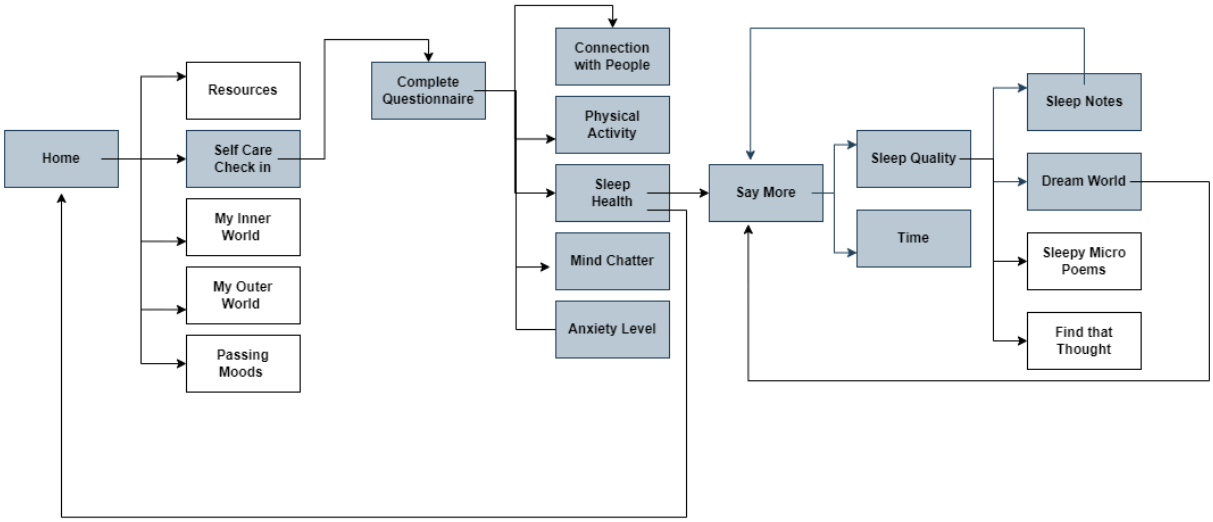


Figure 2: ACT To Enrich Your Life (Only boxes shaded will be used in the usability testing)

To complete tasks in the ‘ACT’ application, the participant was presented with the home page, which has the following options: Self Care Check-in, My Inner World, My Outer World, Passing Moods, Find That Thought, and Resources (See figure 2). For the first task, the participant goes to "Self Care Check-in" and fills out the questionnaires about their: Connection with People, Physical Activity, Sleep health, Mind Chatter and Anxiety Level (See figure 2). The participant can also provide my information for each category by clicking the "Say More" button. Once completed, the participant can click "Done," which will take them back to the home page.

To complete the second task, the participant will have to "Say More" when completing the questionnaire for the "Sleep Health" section. The "Say More" page will allow the participant to record sleep timings in the following categories: Went to bed, Woke up, and Got up. As well as enable the participant to add additional information by going to the next "Say More," which will show them the following options: Dream World, Sleep Notes, Sleepy MicroPoems, and Find that Thought. According to the task, the participant must click "Sleep Notes" to add specific information about their sleep. Once completed, the participant can click "Done," which will take them back to the "Say More" page. Further, the participant can add voice notes by clicking the "Dream World" button. Upon completing the recording, the participant can press "Done" on the top right of the screen.

Smile Scenarios

Task #1 - Using Today's Feelings Feature and Sharing Results with Physician:

Alyssa is a 22-year-old student at the University of Victoria. This is her first time being away from school. She has been feeling rapid breathing and overwhelming panic attacks without reason multiple times in the week, affecting her school and social life. She wants to learn what could be triggering the symptoms. Furthermore, her doctor wants to know if the medicine he prescribed decreases the frequency and severity of her symptoms and wants her to document and share this information with him. Alyssa wants to find an app that is easy to use and will help her document by prompting questions and tracking her symptoms. Also, an application gives her visual graphics of the symptoms she is tracking. She also wants to share the documents with her doctor as she does not want to forget them. Overall, she wants an app that will make it easy to document and share her symptoms without stress.

Task #2 - Using Coping Skills in the Application

Alyssa has been having problems dealing with her anxiety and panic attacks; she wants to learn more about what she could do when she is experiencing anxiety and panic attacks to reduce the severity and length of the anxiety and panic attacks. She has spoken to her doctor about her experience, and her doctor shared doing coping activities during the attacks may help. However, during the attacks, she forgets how to do the copying activity and is unable to search them up during her attacks as she can not breathe or think clearly. Alyssa wants to find an app that contains all the coping activities she may need in one area, so she has easy access to them at any moment.

Scenarios for the ACT to Enrich Your Life

Task #1 - Record Information about your Current Social, Physical and Mental Health

Pat is a 24-year-old student who feels disconnected from other classmates as most of them are a few years younger than Pat and have known each other since high-school time. Pat also feels alienated from work acquaintances because coursework demands do not allow socializing outside of working hours. Having a reduced level of human interaction is not helping reduce Pat's growing sense of isolation. Not being able to express emotional feelings authentically makes Pat feel high emotional distress and anxiety levels. Pat wants to use mechanisms to express emotions authentically to develop a stronger self-understanding and build resilience. Overall, Pat wants to find an easy application to use and will help Pat convey real emotions in a straightforward method.

Task #2 - Record Sleeping Patterns and other details

Pat had shared with their doctor that they have been experiencing anxiety symptoms and have had problems sleeping. Their doctor shared that Pat should focus on improving their sleep habits by going to bed simultaneously and waking up at the same time to improve their mental well-being and help with anxiety management. Their doctor recommends keeping a log of when Pat goes to sleep and wakes up so they know if Pat's sleeping problems worsen or improve. Pat wants to find an app that allows users to enter sleep data regarding timings and add sleep journals as Pat wants to be able to share all their information regarding their sleep.

Phase 4: Selection of Background Questionnaires

A day before the usability testing was conducted, we asked the participant to fill out a simple background questionnaire before interacting with the application. See Appendix A view the questionnaires (Kushniruk, A. W., & Patel, V. L., 2003). The background information about the participants allowed us to better understand our participants and their behaviours (Kushniruk, A. W., & Patel, V. L., 2003). Furthermore, the use of a background questionnaire aids in testing the user's knowledge regarding the application or topic being tested before their use (Monkman, H., 2021). The evaluation environment was remote, and the testing occurred over Zoom. This allowed the participant to be in a comfortable, familiar location and focus on the testing. Additionally, the participant was instructed that they needed a computer and internet access to perform the testing. The developers used Zoom's online recording feature within the laptop to allow for inexpensive, easy functioning, and familiar equipment for the participant (Monkman, H., 2021).

On the day of the testing, the user was provided with an email with both prototypes. During the usability testing, the user was asked to share their screen while using the prototypes over Zoom. The participant was then given a simple explanation for what the application is for, what will be asked from them, and the specific task they need to perform. The study conductors then provided the user with the task during the usability evaluation, waited for them to complete it, and then instructed them on the next task.

After the evaluation, the participant was thanked, informed that they would be seen at a later stage of testing, and then the testing was concluded. After this, the evaluators began assessing the results and reviewing and documenting notes. Possible interference consisted of unforeseen distractions at the participant's home, internet malfunctions or lagging, and the participant being nervous or anxious by being watched by multiple interviewers.

Phase 5: Selection of the Evaluation Environment.

An essential step in conducting usability testing is determining where the testing will occur. Both prototypes conducted a within-subject study design with almost identical eligibility criteria for participants and the same sample selection size. Similarly, the ‘Smile’ and 'ACT' study

design environment was conducted in a remote setting. A remote setting is a common choice to evaluate usability testing. It is the most convenient setting for usability testing and is easy to facilitate small sample groups (Kushniruk, A. W., & Patel, V. L., 2003). Additionally, the remote setting allows users to complete the testing in a space where they are comfortable and may directly allow for more accurate feedback (“What is usability testing?” n.d). Furthermore, during the usability testing, a screen recording was done to record the users going through specific tasks and features (Kushniruk, A. W., & Patel, V. L., 2003). The screen recording collected data on how the user interacts with the prototype Smile or 'ACT' interface in their environment.

Phase 6: Data Collection

Please see the video recording.

Phase 7: Analysis of the Process Data

Method of Analysis

Analysis of the usability test video recordings involved obtaining qualitative data in the forms of converting the audio recording for both prototypes to the written transcript with timestamps, annotating what was happening in the video that was not explicitly said, i.e. non-verbal communication and coding segments of data in categories for insight into the usability problems of the application (Monkman, H., 2021). The coding categories used in this study were derived from "Development of a Video Coding Scheme for Analyzing the Usability and Usefulness of Health Information Systems "(Kushniruk & Borycki 2015). The coding categories used for this study are listed in Appendix B: Coding Scheme, along with their associated interpretation rubrics.

Transcription and Annotation Conventions:

- Participant think-aloud verbalizations are "quoted.”
- *System responses, investigator instructions, and investigator questions are in italic text.*
- Participant actions are preceded with 'Participant:.’
- A separate description of participant action is NOT recorded if the participant's think-aloud verbalization explicitly indicates the participant's action.

Coded Transcript of the 'Smile' Usability Test

00:00 *The application displays the 'SMILE' log-in screen.*

00:02 *The participant is informed that the prototype is under development and does not support data entry. The ‘think aloud’ process is described. The participant is asked to document ‘today’s feelings’, then check results, and transmit them to a physician.*

01:03 “Okay, so I'm going to start out by logging in to the app.

Participant: clicks 'Login' button.

Application displays 'Welcome' screen

01:14 "I'm gonna guess I can access my journal by clicking in menu

Application displays 'Menu' screen

01:20 "and then today's feelings."

Application displays 'Feelings' screen

01:25 "It's all pretty obvious so far and clear."

OVERALL EASE OF USE – positive – navigation

01:30 "Okay, I just click on the text-box to fill in my feelings.

01:38 "And I'm going to click on results now"

Application displays 'Results' screen.

01:41 " I now see a calendar for my feelings and my symptoms. Okay."

01:50 "So and I need to share to the doctor?"

UNDERSTANDING INSTRUCTIONS – Participant requests clarification

01:51 *Confirmation provided*

01:57 "Okay. So click on Share"

Application displays 'Share' screen.

02:02 " Enter first and last name, doctor's email ID and click Send"

Application displays 'Confirm' screen.

02:07 "Confirm. Okay, I like that. I get confirmation feedback.Would I like to send the email?

OVERALL EASE OF USE - positive: workflow

02:13 Participant: clicks 'Send' button.

Application displays 'Confirmation' screen.

02:16 Just Yes, sent. And I also liked that I got a confirmation. Your results were shared. So now I'm not wondering whether or not it went through. Okay."

OVERALL EASE OF USE - positive: visibility of system status

02:26 *Task 2 is described: return to menu*

02:31 Participant: clicks 'Menu' button.

Application displays 'Menu' screen.

02:34 *Task 2 description continues: access other tools, go to the coping skills, and choose a coping skill, perform exercise, then log out.*

02:47 “Okay, so I see other tools located on the page. I'm just going to click on other tools."

Application displays 'Other Tools' screen.

02:55 "There are various options reminders, forum, games, coping skills, click on coping skills"

03:04 *Application displays 'Coping Skills' screen.*

03:05 "I'm going to select breathing as my coping skill."

Application displays 'Breathing' screen.

"Inhale, hold, release. This is what the skills are."

03:18 "Click on coping skills.”

Application displays 'Coping Skills' screen.

03:23 “Do I just need to click on each coping skill?”

UNDERSTANDING INSTRUCTIONS – Participant is unclear on the extent of the activity the investigators are asking her to perform.

03:22 *Participant is encouraged simply to explore.*

*0*3:28 “Oh, okay.I'm now clicking on another coping skill: 54231"

Application displays '5-4-3-2-1' screen

03:31 "press play when you are ready, follow the instruction video. Oh, it's a grounding exercise"

Participant: [...]

Application [...]

03:40 "Going back to the other coping skills"

Application displays 'Coping Skills' screen.

03:43 "clicking on gratitude"

Application displays a 'Gratitude' screen.

"What are three things that you that went well today?"

Participant: clicks on 'Coping Skills' button

Application displays 'Coping Skills' screen.

03:50 "Okay. I just selected all the coping skills"

Participant: clicks on 'Scenarios' button

*Application displays '*Scenarios *screen.*

03:55 "The last one was scenarios"

03:59 "clicking the main coping skills button again"

Application displays 'Coping Skills' screen.

04:01 "to go back to the menu with all the skills present. I reviewed all the coping skills, everything was pretty simple and easy to navigate through.

OVERALL EASE OF USE – positive - navigation

04:16 "If that's the end of the task, should I log out now?“

04:18 *Confirmation that task has ended.*

Participant: clicks on 'Log out' button

Application displays 'Smile' Login screen.

04:19 “Okay, so the Logout option is pretty simple. It was just on the top right of the screen, and the app logged me out.”

OVERALL EASE OF USE – positive - navigation

Post-task review of application

04:27 The p*articipant is invited to identify positive or negative features of the prototype.*

04:36 “I think everything was pretty straightforward. And very user-friendly.”

OVERALL EASE OF USE - duplicative - positive - navigation

04:43 “something I really liked was receiving feedback from the system when I sent the confirmation email to the doctor, just so you know, the user understands that the results were actually sent.”

OVERALL EASE OF USE - duplicative - positive – visibility of system status

05:00 “I like that it's not over-complicated is it just has whatever it needs. Very small menu. And there are not too many words on the screen. The buttons are very easily accessible”

OVERALL EASE OF USE - **NEW OBSERVATION** - positive - layout

05:19 “logging in and logging out or is a very simple process”

OVERALL EASE OF USE - duplicative - positive - navigation

05:23 Post-task discussion ends

Coded Transcript of the 'ACT to Enrich Your Life' Usability Test

05:38 *Application is displaying 'ACT to Enrich Your Life' home menu screen*

05:38 *Participant is informed that the prototype is under development and does not support data entry. The tasks to be performed are describe. The participant is invited to explore the application prior to beginning the test in order to get familiar with the layout before formally beginning the test. The participant is informed that when she is ready to begin, the test tasks will be described again.*

07:19 “All right, sounds good. And just going through the self-care check-in option”

07:22 Participant: clicks on Likert bubble(s)

07:22 Prototype screen populates

07:30 “I see there are various bubbles to identify the level of at the level of feeling I am feeling currently anxiety level, mind chatter, sleep health. Okay.

07:50 “I’ll click Done”

07:52 “I’ll go to my next option on the menu, it's my inner world … Okay,

07:54 Participant: hovers across the menu options with mouse, settles and taps on ‘Speak Your Mind’ button

“Okay, I’ve identified how to record myself. Okay”

08:02 Participant: clicks ‘Done’ button

Application returns to Inner World menu

08:04 Participant: clicks ‘Done’ button

Application displays ‘Scrivellings’ text entry screen

08:06 Participant: clicks ‘Done’ button

Application returns to Inner World menu

08:08 Participant: clicks ‘Find That Thought’ button

Participant:scans screen

08:20 “Okay, I clicked find that thought which at first seems a little confusing, I wasn't really sure what it meant.”

MEANING OF ICONS/TERMINOLOGY – “Find that Thought” is not obviously a search function and is not discovered to be one until after it has been selected.

“But now that I see all the various options, I understand, it's probably looking through my previous checked check-ins and my previous information and navigating through it.

08:28 Participant: clicks ‘Done’ button

Application returns to Inner World menu

Participant: returns to Main Menu

Participant: clicks on ‘Outer World’ button

Application displays Outer World menu

Participant: hovers cursor across items on Outer World menu

Participant: clicks on done to return to Main Menu

08:41 Participant: clicks on ‘Passing Moods’ button

08:42 “Okay, on passing moods, there is a lot of moods with images, which I like”

CONTENT – positive comment

08:51 Participant: clicks on a mood emoji

08:55 “Once you click on a mood, you can type in why you feel that way, which I really like,

FUNCTIONALITY – positive comment

08:59 “click Done”

09:01 “Resources”

09:04 Participant: clicks on done to return to Main Menu

09:05 “Okay, I think I've gotten a feel of the application and I can I'm now ready to perform the task.

09:15 *Participant is reminded that it is not a working prototype with data entry, and to think aloud. The sequence of tasks is repeated: record information about current social, physical and mental health record additional details about sleep experience; proceed to record further information about your sleep - an audio note, a general note and a micro-poem. then return to home screen. The participant is told that she can ask to be reminded of next step at any time.*

10:20 “Okay, sounds good. Thank you.”

10:25 “All right, so I'm going to first click on self-care check-in.”

10:29 Application displays Self-Care Check-in screen

10:33 “Just to note in how I'm feeling socially connecting with people, my physical activity, my sleep health, mind chatter and anxiety “

10:47 “I click on Actions which shows me how to cope with my current feelings, which is good.”

11:01 “Click on done.”

11:13 “So once I click on each attribute, and I click on Done, I'm guessing all my information has been recorded.

Application displays Main Menu

11:18 “However, I haven't received any feedback, so I'm a little unsure.

VISIBILITY OF SYSTEM STATUS – unsure if data has been saved

11:21 Participant: hovers cursor across buttons on Main Menu11:23

Participant: clicks ‘My Inner World’ button

Application displays Inner World menu

11:24 “The next thing to do is…”

11:28 Participant: hovers cursor across menu buttons then clicks Home icon on bottom left of Inner World menu

Application displays Main Menu

11:29 Participant: clicks Self-Care Check In button

“record my sleep levels, which I think I did.

11:31 Participant: clicks Home icon on bottom left of Self-Care Check In screen

Application displays Main Menu

11:32 Participant: clicks ‘My Inner World’ button

*Application displays Inner World menu*11:34

Participant: clicks ‘Speak Your Mind’ button

Application displays Speak Your Mind voice recording screen

11:35 “But take a voice recording of my sleep levels. Is that what you asked for?

UNDERSTANDING INSTRUCTIONS - ambiguous task instruction: overloaded meaning of word “record”.

11:37 *The participant is reminded that the task was to record detail about current state and then to record additional specific detail about sleep*

11:49 Okay. A voice recording or would you like …

11:52 Participant: positions cursor over ‘Home’ button at bottom left of screen but does not click

UNDERSTANDING INSTRUCTIONS - ambiguous task instruction: overloaded meaning of word “record”.

11:57 *The researcher provides hint that the task involves specific detail about sleep*

11:59 Participant: clicks ‘Home’ button

The application displays the Main Menu

12:02 “Okay, all right. Thank you. I misheard the task.

NAVIGATION – user interface ‘details’ button is not prominent enough

12:04 Participant: clicks ‘Self-Care Check-in’ button

The application displays the Self-Care Check-in screen

12:08 “So I go back to my self check-in “

12:12 “and I click on my…, and I click on sleep health”

12:14 “I want to click on details”

Participant: clicks ‘Detail’ button in ‘Sleep Health’ section of check-in screen

The application displays the Sleep Quality screen

12:16 “to kind of give in a more in-depth level of my sleep quality”

12:21 Participant: clicks Sleep Quality Likert bubble

The application displays sleep time tap-and-slide clock widget

12:27 “I now see options of when to enter when I went to bed when I woke up”

12:33 “ And when I actually got out of bed”

12:39 “There is a clock, which allows me to click on each time to enter details for went to bed woke up and got out of bed, which is cool”

OVERALL EASE OF USE – positive – tap-and-swipe clock data entry

12:54 “but it's also a little confusing because it did not say that that's what was going to happen”

NAVIGATION - no instruction provided on screen for using tap-and-swipe clock data entry widget

“It's not letting me enter information on when I got up. But that's probably because it's just a prototype, and I can't input information”

“Okay. So I've entered additional details of my sleep quality”

13:17 “I'm going to click on Done”

13:18 *Investigator interrupts before action is performed; the participant is reminded that the next task is to record some specific information about their sleep.*

13:26 “Okay. So I will now click on ‘say more’ next on my sleep option”

The application displays the ‘Say more … Sleep’ screen

“there are various options.”

13:40 Participant: clicks ‘Sleep Notes’ button

The application displays a ‘Dear Diary’ screen in error

“I'm gonna take some notes on my sleep quality, and just additional things I felt, type it in”

13:51 “click Done.”

The application displays the ‘Inner World’ menu in error

13:55 “And take a voice recording of my sleep.

Participant: clicks ‘Speak Your Mind’ button

The application displays a voice recorder screen

13:57 “Click on record, it allows me to talk and record.

“Click on pause. And I don't see an option to oh no, there it is. Never mind and recording.

14:15 Participant: clicks ‘End Recording’ icon

The application displays the ‘Inner World’ menu in error

14:16 “But now when I clicked end recording, I'm a little unsure whether it saved my recording or not or did it just delete it?

VISIBILITY OF SYSTEM STATUS – unsure if recording was saved

“But I was able to record my additional details on sleep.

14:30 “We're going to look at some micro-poems about sleep.

Participant: clicks ‘Micro-Poems’ button

The application displays short-form version of note widget

14:43 “It was pretty straightforward. I could just type in the information and click Done again.

The application displays the ‘Inner World’ menu

OVERALL EASE OF USE – positive – consistent interface

14:46 “And is that the end of this task?

14:48 *Confirm that the task is done.*

Phase 8: Interpretation of Findings

Quantitative data

There were 19 items coded during the usability tests. Of these, ten were positive observations by the participants (four for 'ACT' and six for ‘Smile’), five were usability issues (all with 'ACT'), and four items were related to instructions for desired tasks (two during each of the usability tests). A summary of positive observations is provided in Table 2 below. Usability issues are shown in Table 3 below. Appendix C - Coded Items provides separate tables listing all codified items for each application.

Positive Observation Themes	**'ACT'**	**SMILE**
Content	1	
Functionality	1	
Layout		1
Navigation		3
Status Visibility		1
Workflow	1	1
Total Positive Observations	**3**	**6**

Table 2: Themes and Counts of Positive Observations Identified During Coding of Usability Tests, by Application

Usability Category	Issue Detail	'ACT'	‘Smile’
Meaning Of Icons/Terminology	Not obvious that "Find That Thought" is a search function	1	
Navigation	Detail' button not prominent	1	
	No Instruction for Clock widget	1	
Visibility Of System Status	Not sure if check-in data saved	1	
	Not sure if voice recording saved	1	
Total Usability Issues Identified		5	

Table 3: Usability Issues Identified During Coding of Usability Tests, by Application

Usability Problems

The data collected illustrated that from both applications, ‘ACT’ was the only application that had significant usability issues, including terminology, aviation and visibility problems.

The terminology issue was the unintuitive labelling of the search function. The investigators would recommend providing a different label for this function so users can immediately understand the function without accessing it and interpreting the screen elements to discover its purpose.

The navigation issue concerned difficulty finding a 'Detail' button associated with recording sleep quality information. The investigators would recommend restructuring the layout of the 'Self-Care Check In' screen, so the 'Detail' buttons are separated more clearly from the associated Likert scale data entry panels. A similar approach could be taken with the 'Say More' voice and text narrative functions. For this latter, an alternative approach could be to have a single 'Say More' button that led to a second topic selection screen. The developers are recommended to investigate both of these options in light of the underlying intent for the application. A second navigation issue concerned using the experimental clock-face time data entry control in the Sleep Detail screen which introduced a momentary challenge for the participant. The participant expressed both positive and negative opinions concerning the control, calling the control itself 'cool' but criticizing the lack of instructional text. However, the investigators' subsequent review of the function of the screen identified a different usability issue that was not detected in the usability test itself; the control creates a visual separation between the tapping-and-sliding operation of the control and the display of the resulting time value. To correct this, the investigators have proposed eliminating the clock-face control and replacing it with three individual time selection controls for each of the time items being recorded.

Finally, there was two visibility of system status issues where the participant was uncertain whether the action performed had saved the data. The investigators would advise the 'ACT' developers to review the entire application to ensure that all such actions provide clear indicators of successful completion of data operations.

Positive Observations

The participant shared positive observations regarding both applications. The ‘Smile’ application was notable for its ease of use, particularly about navigation, positive feedback regarding layout, workflow, and status visibility; the participants also shared their appreciation that the app gives feedback to the user regarding sending information to the doctor and saving content. The 'ACT' application was commended for content and functionality related to capturing momentary moods and the associated mental process. The participant also shared positive feedback regarding the ease of data entry workflow.

Instructional Communications

During the usability testing for both applications, the participant requested instructional clarification from the developers while trying to complete tasks. The instructional requests from the participant for 'Smile' were relatively straightforward as the participant asked for confirmation of the next step (at timestamps 01:50 and 03:23). During the 'ACT' usability test (at timestamps 11:35 and 12:02), there was a bit more confusion due to the multiple potential interpretations of the word "record" in the investigator's instruction to "record more detail" and uncertainty as to what the key focus of the instruction was intended to be. During this interaction, the participant was fixated on the word "record" whereas the instruction was intended to cue on "detail." During the verbal communication in this interaction, the participant was rapidly navigating across the application screens to select and then exit the voice recording feature as she was interpreting the responses being provided by the investigator. When the participant determined that the focus was not voice recording but rather "detail," she quickly navigated to the correct screen and selected the detail button. In terms of process, the investigators believe that the uncertainty that arose within this interaction was due to the investigator's desire to avoid being too directive in responding to the participant's question.

Phase 9: Iterative Input into The Design

Improvements for Prototype Smile

During the usability testing, the observers did not identify any usability issues, nor did the participant share any suggestion for improving the ‘Smile’ application. The participant

commented that the app was easy to use and understood how to complete tasks and the purpose for the features.

Improvements for Prototype ACT to Enrich Your Life

Navigation Error:
The user was asked to record information about their current physical, social, and mental well-being. Further, the user was asked to record additional information about their sleep health using written and audio notes. This was a miscommunication as the observer used the word “record.” Due to this the participant was confused if they had written the notes or completed an audio recording. This miscommunication confused the participant and they struggled to complete the task. The usability testers also realized that this page had too many buttons, which may have overwhelmed the user, due to which they had issues navigating to the “Sleep Health” through the “Say More” buttons. In order to fix this issue, the app developer deleted the five “Say More” buttons and instead gave the user additional information at the end of the check-in by adding a separate page with all the categories.

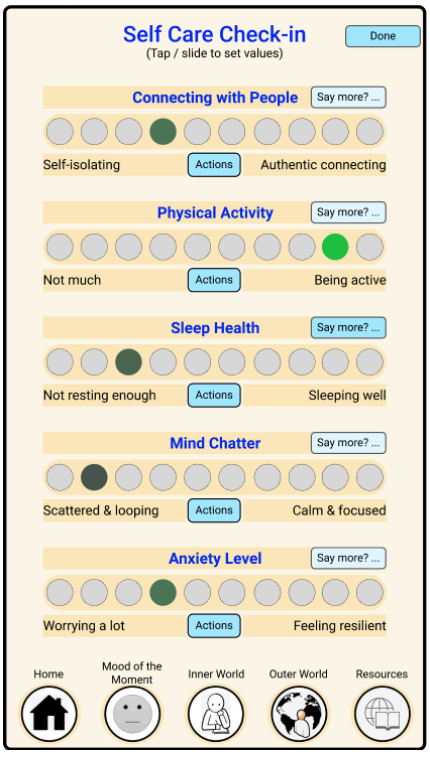
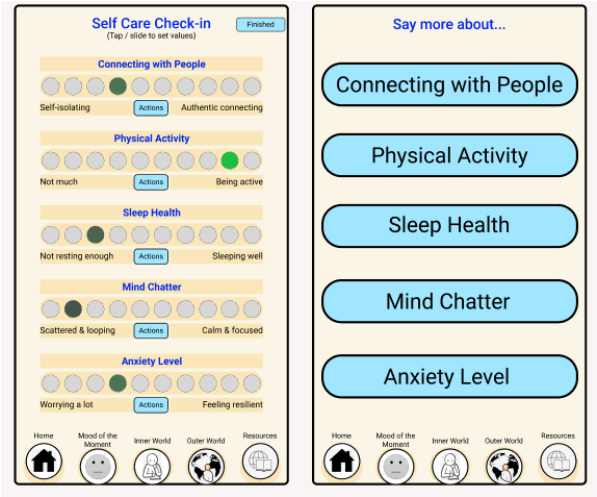
Before:	After
	

Figure 3” Before and after changes to the Self Care Check-in in ‘ACT’

Usability Error:
The user was asked to add further information about their sleep and add timings of their sleep schedule. While completing the task, the user realized that the clock presented was a fascinating icon, but the page was missing instructions to use it, which confused when trying to add the timings. Therefore, the developer changed the data input method. Instead of using the clock, the new method allows the user to add the timings manually.

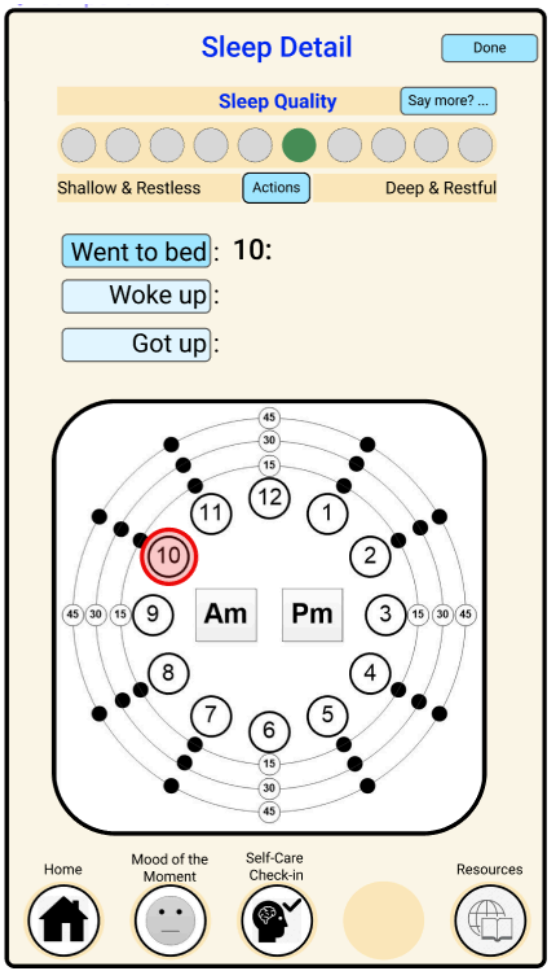
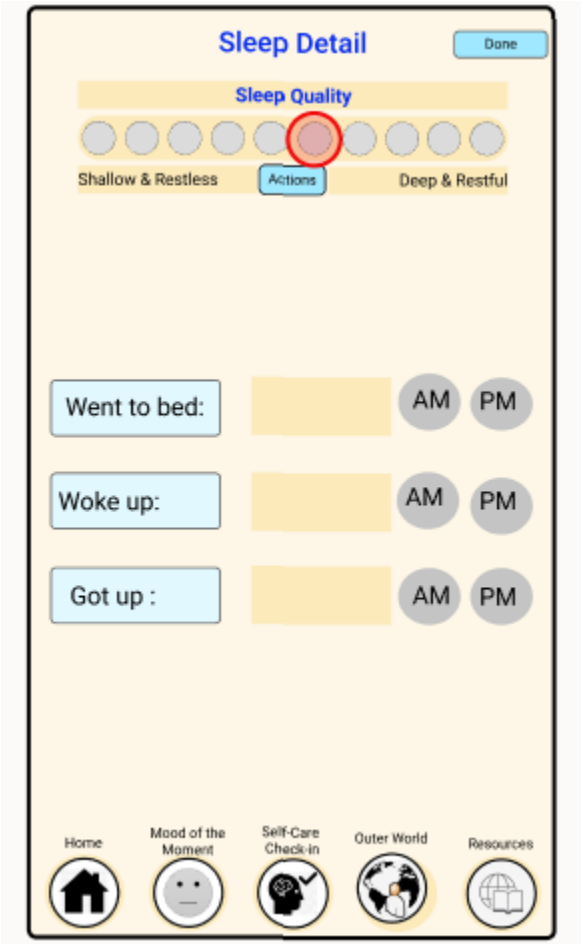
Before:	After:
	

Figure 4: Before and after pictures of the changes to the clock function in ‘ACT’

Combination of Smile and Act to Enrich Your Life Applications

The developers from both applications came together and integrated the most important and valuable features. The developers also decided to continue using the layout and design

criteria used by the ‘Smile’ application regarding positive feedback and no usability issues during the usability testing. Features such as the: Add Moods page, Self Care Check-In page, and the Speak Your Mind page were incorporated from the “ACT” application. Moreover, the moods page from ‘ACT’ was added as a part of the journal entry from ‘Smile,’ as it can give better insight into how the user feels and provide the user more choices. The speak your mind pages were added to the ‘other tools’ page in the ‘Smile’ application to allow the user to record audio notes instead of written notes, making this application more accessible to all types of users. Finally, the self-care check-ins were added to the main page of the ‘Smile’ application as both developer and participant understood the value of users sharing more detailed information regarding their surroundings, physical and sleep health, and their anxiety levels. This hybrid application can be seen below in figure 5.

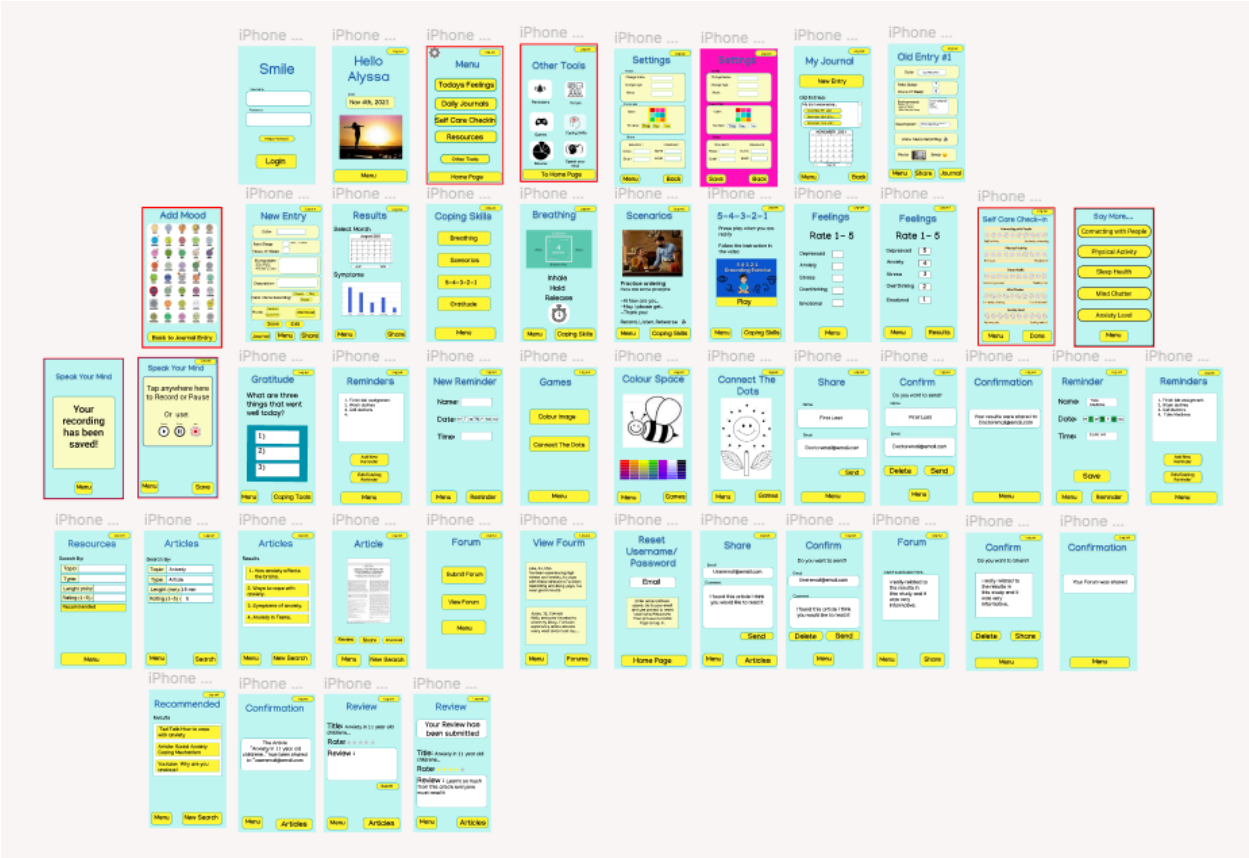


Figure 5: Combination of most important features from both applications

Discussion

Comparing Evaluation Objective to The Pilot Test

The objectives of this evaluation were to gather usability data for both ‘Smile ‘ and ‘ACT’ to:

1. Identify usability problems
2. Gather insight of potential valuable additions or changes to the application
3. Identify the strength of both applications, which could be incorporated into a third hybrid application.

It is difficult to know if the first two evaluation objectives were met during the pilot test for 'Smile' as any critique was absent. The study participants did not identify or encounter any usability problems, did not share any potential usability improvements. The lack of the ability to identify usability problems could be due to the participant being familiar with Figma, where the prototype was developed, and the way the developers approached usability testing and instructed the participant. However, the first two objectives of the 'ACT' application appear to have been met as several usability issues were identified and possible critiques to the app that will improve application usability. Furthermore, the third objective of the evaluation, which is to incorporate desirable features from both applications into a third hybrid application, has been met.

Refinement to The Evaluation Plan

The evaluation plan consisted of finding candidates to test the usability of the applications as they were asked to complete tasks over a remote online, face-to-face video communication application. The parts of the evaluation plan that need to be changed regarding the usability testing include:

- Providing the task clearly before the user begins to perform each one individually,
- Ensuring there is enough time provided for the participant to complete each task,
- Possibly adding time limits to each task.

To ensure it is being used efficiently and participants can easily maneuver through it.

Opportunities

This evaluation allowed the developer to identify areas where the application could be improved and learn more about the application's user experience on a deeper level. The ability to conduct the testing virtually allowed the observers to screen record the actions performed by the user while completing the tasks. This allowed observers to go back to the recording and pinpoint those parts of the interface design where changes could be made to increase the application's usability. This arrangement also allowed the user to share their screen so that the observers could draw clues from gestures, hesitations, mouse-hovers, etc. This also helped the observers identify exactly which button and layout features could seem confusing to the user. It also allowed observation of user behaviour when given non-specific instructions on how to

complete the task, instead of just telling them what the task is. This also helped us identify any understandability issues with the tasks included in the application.

Challenges

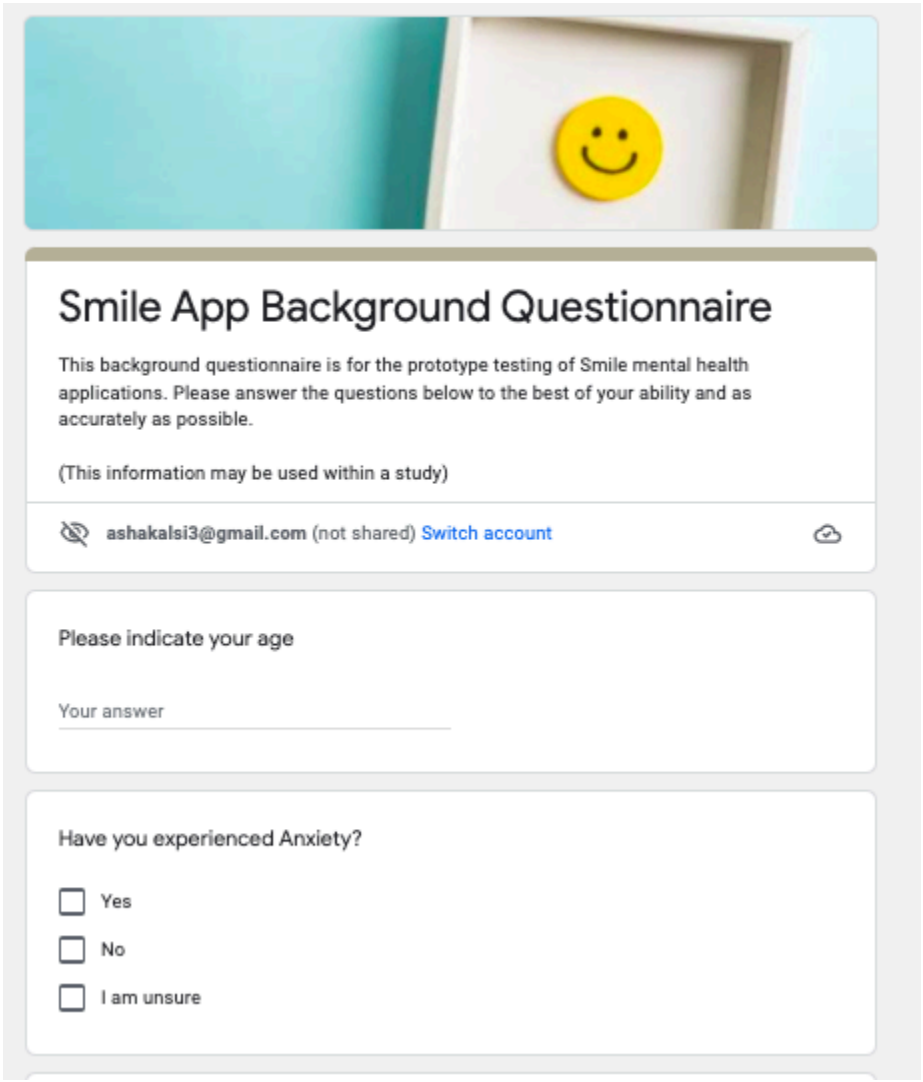
The greatest challenge in this process is the detailed deconstruction of the participant's actions captured in the video and the participant's verbalizations. Even though it was a challenge, deconstructing the user's actions were vital as it helped observers identify features that might be blocking participants from completing the task. Another challenge was using the screen-recording as a reference to understand the user's thoughts when the user did not verbally share their thought process. During the pilot test, most of the participant's actions are not captured by the 'think-aloud' process. Therefore, the team relied on tracking the participant's application gestures such as hesitations, mouse-hovers, what buttons they click etc. As an insight into what their thought process may be.

Conclusion

Evaluation of both applications provided valuable data, which was used to help improve both applications. The usability testing process allowed developers to understand what is needed to construct a mental health support application and what aspects of these applications are crucial for users. The usability test for ‘ACT’ resulted in numerous usability problems regarding necessary changes to improve the application functionality and positive aspects of the app. The usability test for ‘Smile’ demonstrated that it had no usability problems, and the participant shared many positive thoughts on the app regarding functionality, layout and design. The quantitative and qualitative data gathered illustrated the strongest feature in each of the applications, which led the combination applications to make one application containing all the positive aspects of ‘Smile’ and ‘ACT.’ From the feedback, the developers decided to use the ‘Smile’ application layout and design as the participant shared no changes to the app and explained they like the simplicity and colour of ‘Smile’. Furthermore, the participant explained that they appreciated the use of the features Add Moods page, Self Care Check-In page, and the Speak Your Mind page from the ‘ACT’ application. Those features were incorporated into the ‘Smile’ application. Overall, the evaluation plan designed for ‘Smile’ and ‘ACT’ was beneficial and supported the developers during the usability testing phases. Moreover, the developers were able to gather crucial information regarding their applications to make positive progress.

APPENDIX A: Background Questionnaire

The background questionnaire for ‘Smile’ usability testing can be viewed by clicking this link https://forms.gle/tRh6srr1bsArSShU6 and to view the background questionnaire for 'ACT,' click this link https://forms.gle/bsybuM4VkaHmUpn8A.



If you experience anxiety, how often?

- ◯ Multiple times a day
- ◯ Multiple times a week
- ◯ A few times a month
- ◯ Every few months
- ◯ Not very often

Have you ever received professional support for any mental health issues?

- ◯ Yes
- ◯ No
- ◯ Would not like to specify

Have you used any mental health support apps in the past?

- ◯ Yes
- ◯ No

If you answered yes above, please indicate which application you have used.

Your answer

What is you Computer literacy level?

Choose

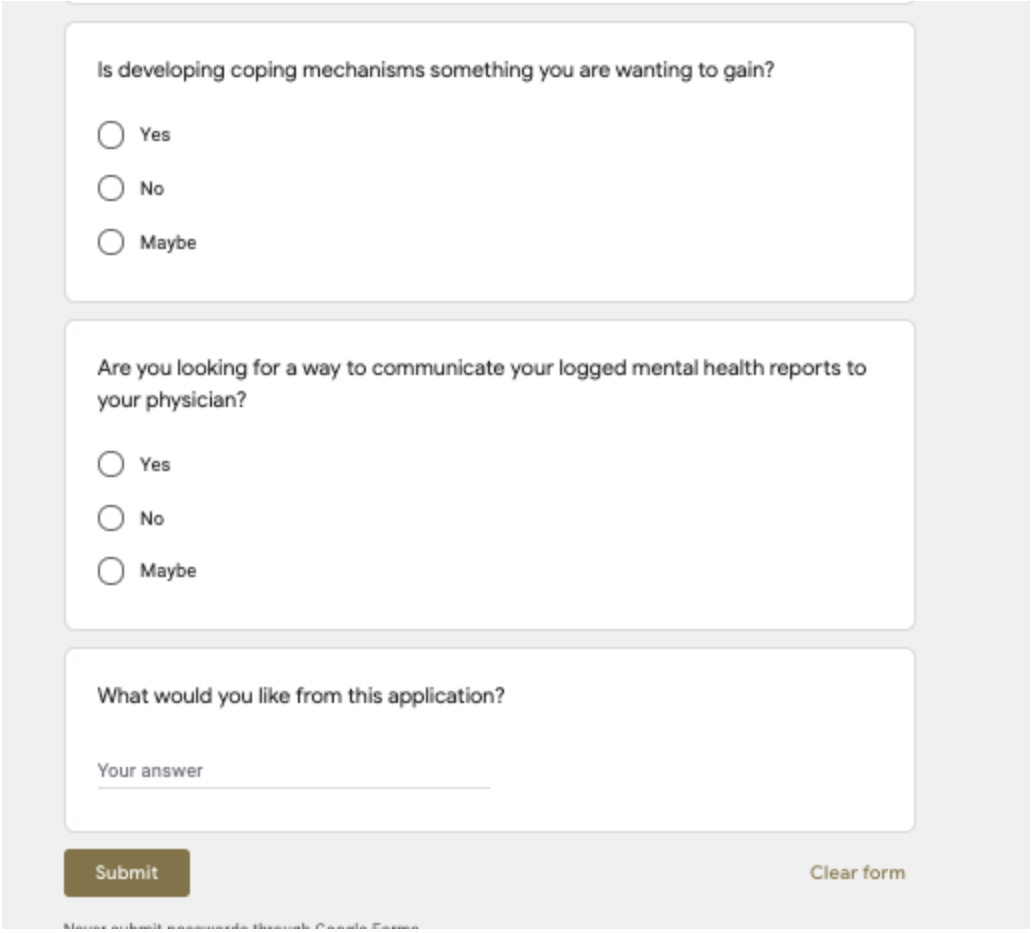


Image 1: ‘Smile’ application usability background questionnaire.

ACT to Enrich Your Life Background Questionnaire

This background questionnaire is for the prototype testing of ACT to Enrich Your Life mental health applications. Please answer the questions below to the best of your ability and as accurately as possible.

(This information may be used within a study)

Please indicate your age

Your answer

Have you ever experienced disconnect or isolation?

- ◯ Yes
- ◯ No
- ◯ Maybe

How often do you isolated or disconncted?

- ◯ Multiple times a day
- ◯ Multiple times a week
- ◯ A few times a month
- ◯ Every few months
- ◯ Not very often

Have you ever received support for mental health?

- ◯ Yes
- ◯ No
- ◯ Would not like to specify

Have you ever used any mental health support apps in the past?

- ◯ Yes
- ◯ No

If indicated yes above, please specify which application was used.

Your answer

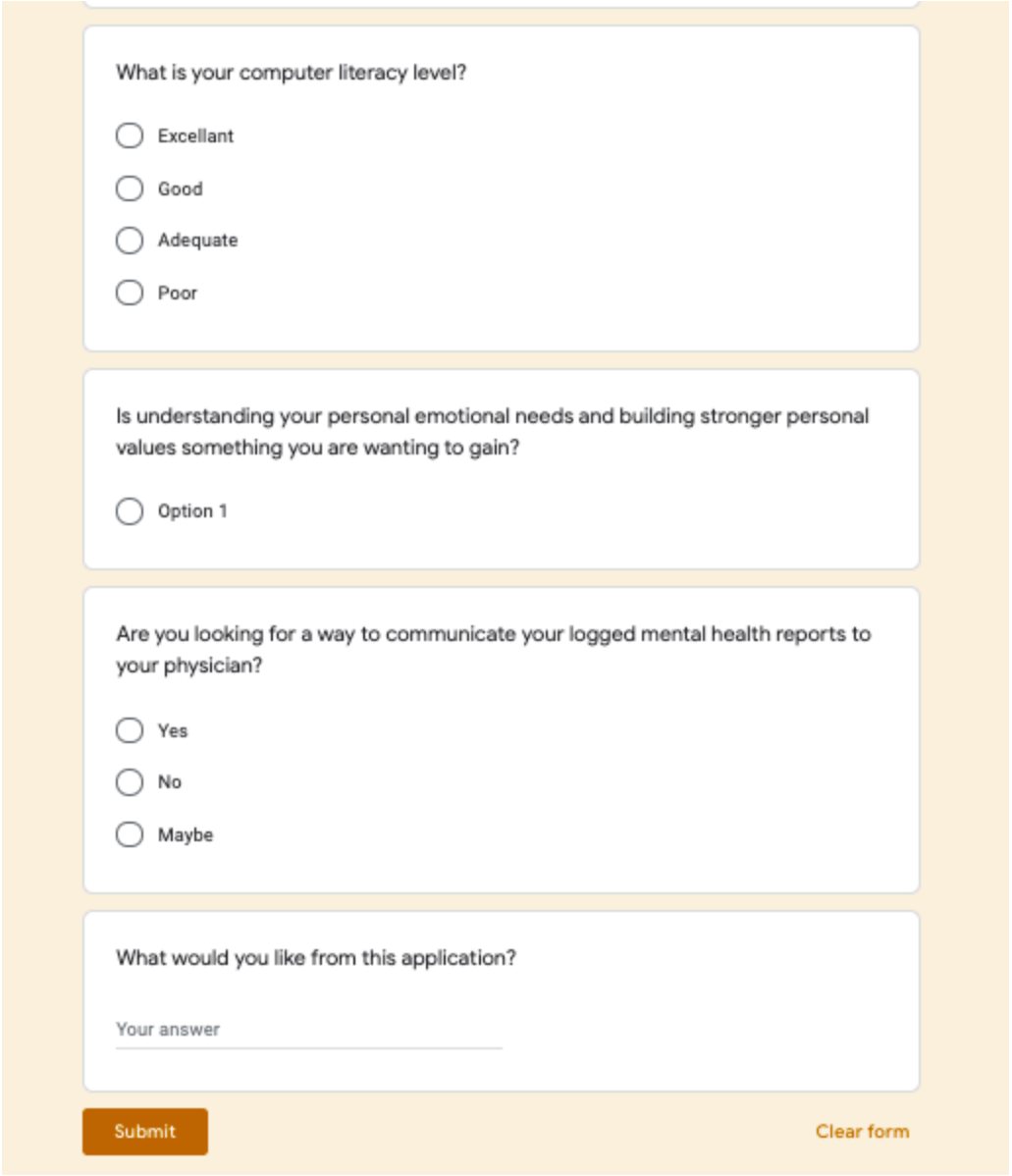


Image 2: ‘ACT’ application usability background questionnaire

APPENDIX B: Coding Scheme

from: Kushniruk, A. W., & Borycki, E. M. (2015, August). Development of a Video Coding Scheme for Analyzing the Usability and Usefulness of Health Information Systems. In *CSHI* (pp. 68-73).

VIDEO CODE	WHEN APPLIED
NAVIGATION	Coded when a review of the video data indicates the user has problems moving through a system or user interface
CONSISTENCY	Coded when a review of the video indicates the user has problems due to a lack of consistency in the user interface
MEANING OF ICONS/TERMINOLOGY	Coded when a review of the video data indicates the user does not understand language or labels used in the interface
VISIBILITY OF SYSTEM STATUS	Coded when a review of the video data indicates the user does not know what the system is doing
UNDERSTANDING ERROR MESSAGES	Coded when a review of the video data indicates the user does not understand the meaning of error messages
UNDERSTANDING INSTRUCTIONS	Coded when a review of the video data indicates the user does not understand user instructions
WORKFLOW ISSUES	Coded when a review of the video data indicates when there are issues with system workflow negatively impacting user interaction
GRAPHICS	Coded when a review of the video data indicates there are issues with graphics
LAYOUT	Coded when a review of the video data indicates there are problems with the layout of screens or information on those screens
SPEED/RESPONSE TIME	Coded when a review of the video data indicates the system is slow or response time is an issue

COLOR	Coded when a review of the video data indicates the user does not like colour or colour schemes used in the interface
FONT	Coded when a review of the video data indicates the font is too small or not readable
OVERALL EASE OF USE	Coded when the user comments on the overall usability of the user interface

Table 4: Coding Rubric

Appendix C: Coded Items

Coded Item	**Preceding TImestamp**
OVERALL EASE OF USE – positive – navigation	01:25
UNDERSTANDING INSTRUCTIONS – Participant requests clarification	01:50
OVERALL EASE OF USE - positive: workflow	02:07
OVERALL EASE OF USE - positive: visibility of system status	02:16
UNDERSTANDING INSTRUCTIONS – The participant is unclear on the extent of the activity the investigators are asking her to perform.	03:23
OVERALL EASE OF USE – positive - navigation	04:01
OVERALL EASE OF USE – positive - navigation	04:19
OVERALL EASE OF USE – positive - layout	05:00

Table 5: Coded Items for "SMILE" Application

Coded Item	**Preceding TImestamp**
MEANING OF ICONS/TERMINOLOGY – “Find that Thought” is not obviously a search function and is not discovered to be one until after it has been selected.	08:20
CONTENT – positive response – no detailed code	08:42
FUNCTIONALITY – positive response – no detailed code	08:55
VISIBILITY OF SYSTEM STATUS – unsure if data has been saved	11:18
UNDERSTANDING INSTRUCTIONS - ambiguous task instruction: overloaded meaning of word “record”.	11:35
UNDERSTANDING INSTRUCTIONS - ambiguous task instruction: overloaded meaning of word “record”.	12:02
MEANING OF ICONS/TERMINOLOGY – user interface ‘details’ button is not prominent enough	12:02
OVERALL EASE OF USE – positive – tap-and-swipe clock data entry	12:39
NAVIGATION - no instruction provided on-screen for using tap-and-swipe	12:54

clock data entry widget	
VISIBILITY OF SYSTEM STATUS – unsure if the recording was saved	14:16
OVERALL EASE OF USE – positive – consistent interface	14:43

Table 6: Coded Items for "ACT to Enrich Your Life" Application

References

Kushniruk, A. W., & Borycki, E. M. (2015, August). Development of a Video Coding Scheme for Analyzing the Usability and Usefulness of Health Information Systems. In CSHI (pp. 68-73).

Kushniruk, A. W., & Patel, V. L. (2003). Cognitive and usability engineering methods for the evaluation of Clinical Information Systems. *Journal of Biomedical Informatics*, *37*(1), 56–76. https://doi.org/10.1016/j.jbi.2004.01.003

Monkman, H (2021) Usability Testing. From https://bright.uvic.ca/d2l/le/content/146251/viewContent/1395692/View

What is usability testing? The Interaction Design Foundation. (n.d.). Retrieved November 24, 2021, from https://www.interaction-design.org/literature/topics/usability-testing.